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Maine Agricultural Experiment Station

BULLETIN No. 144. JUNE, 1907.

POULTRY EXPERIMENTS.

This bulletin contains an account of the brooder houses, houses for hens, and the methods of feeding used at the Station; the Maine Station trap nest; and a feeding experiment with whole vs. cracked corn

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AGRICULTURAL EXPERIMENT STATION,
Orono, Maine.

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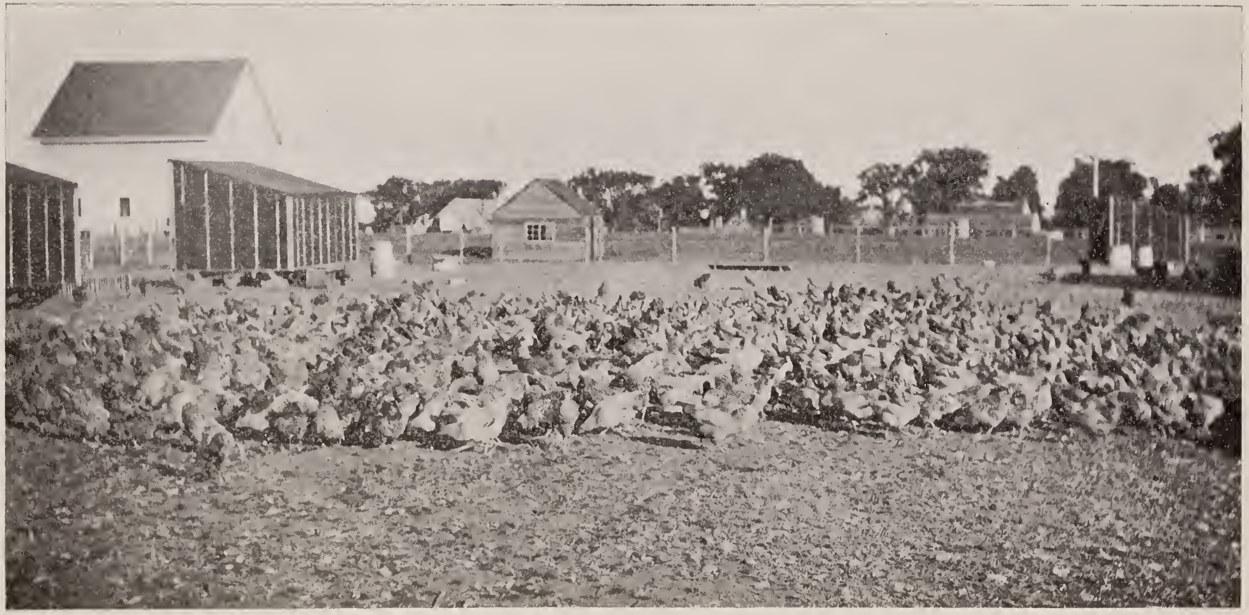

Figure 17. Chickens on the Range. See page 151.

POULTRY EXPERIMENTS, 1906-7.

G. M. Gowell.

[The poultry work of the Experiment Station was undertaken primarily to study breeding for egg production and has been in progress for several years. Three years ago the Bureau of Animal Industry of the U. S. Department of Agriculture desired to cooperate in the work and is now contributing $1,000 per year to assist in the carrying forward of the breeding and housing experiments. Considerable unpublished data from these experiments have accumulated, but it has been decided to hold this matter until the experiments shall be so far advanced that the results shall be conclusive.

The following papers on poultry experiments have been published. These are no longer available for distribution. A summary bulletin bringing the work up to 1906 has been issued by the Bureau of Animal Industry of the U. S. Department of Agriculture. This can be obtained by addressing the Secretary of Agriculture, Washington, D. C.

Number of Laying Hens that can be profitably kept in one Pen, Annual Report for 1898.
Feeding Chickens for Growth, Bulletin 64.
Breeding for Egg Production, Bulletin 64.
Feeding Chickens for Growth, Bulletin 79.
Experiments in Incubation, Bulletin 79.
Breeding for Egg Production, Bulletin 79.
Breeding for Egg Production, Bulletin 93.
Floor Space, etc., in relation to Egg Production, Bulletin 93.
Poultry Management as practiced at the Maine Station, Bulletin 100.
Poultry Experiments, 1903-5, Bulletin 117.
Poultry Experiments, 1905-6, Bulletin 130.

This bulletin (144) in addition to containing accounts of experimental work, supplements bulletins 100, 117 and 130 by outlining the methods of housing and handling the stock that have been adopted since those bulletins were issued.—C. D. W.]

POULTRY HUSBANDRY.

Poultry husbandry is a legitimate agricultural industry. It is as well grounded as dairying, animal raising, fruit or crop growing. It occupies a special place in agriculture, and it will never displace other work except on limited areas. It requires large quantities of grains and concentrated feeding material and but small quantities of bulky foods. Larger animals must always occupy the farms and prepare the coarser crops of the land for market, and upon their number and quality depends the prosperity of agriculture.

Poultry is kept in small numbers on almost every farm as gleaners or scavengers. Hatched and brooded by natural means, practically unrestrained, they find the exercise necessary for their existence, and such varieties of food as are common about the farm are condusive to their welfare. If the food supplies are generous and shelter and shade sufficient, life with them is at its best and it is doubtful if returns from any other source come to the farmer with so little expenditure of material, work and thought.

With this common knowledge of the earnings of birds, has come the desire to increase their numbers and make their keeping a department of the farm or a special extensive industry. That this is practicable is demonstrated by the many plants in successful operation. The factor that has brought success to these plants is the skill of the operators.

The skill required in successfully rearing and keeping birds in large numbers, by artificial means, for continuous years, is not beyond what may be acquired by the common person, provided he will train himself to see and do what should be done. Great skill is not secured in a single year but it comes to those who try. The purpose of this, and other bulletins issued by this Station on poultry matters is to make known our methods of work and the results of the investigations conducted.

It is not claimed that our systems are perfect, or better than all others, but they are the best, for us, of any that we know. We are constantly trying to learn more about every phase of the industry and the information gained is given to the public in these bulletins, as it is secured. Some of the matter in this issue has been given in a previous bulletin, but as the supplies of that issue are exhausted and the calls for the matter so great, it is rewritten and printed again.

BROODER HOUSES.

Portable brooder houses of several different sizes and styles of construction are in use, sufficient to accommodate 2,000 chickens to maturity. The style of house that has proved most satisfactory, with us, is here described.

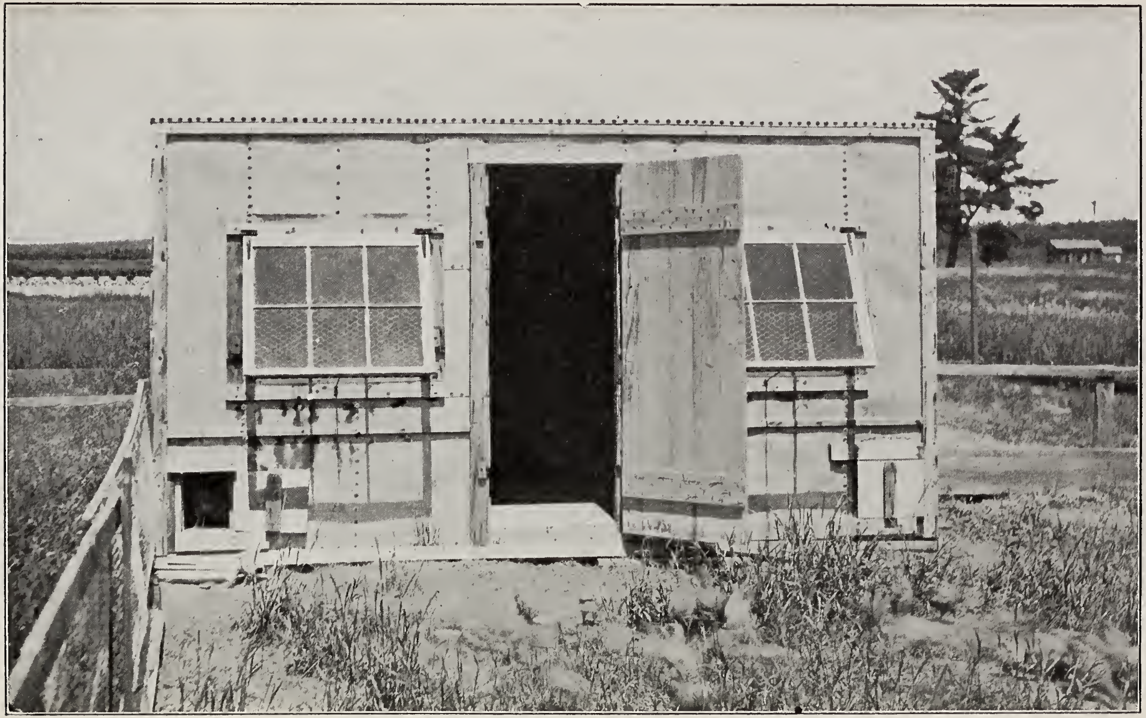

Figure 18. Movable brooder house. See page 146.

Each of the houses accommodate 125 or 150 chicks from the time brooding commences until they are moved into winter quarters. They are large enough so the necessary work can be done comfortably in them. During rainy days, when the birds must be kept indoors, there is room for them, and they will not suffer seriously if the floors are generously covered with cut clover or chaff. The birds in them are safe at night from storms, and all thieves that walk on four feet, crawl, or fly. They are built on shoes so that they can be drawn near together for convenience in the brooding season, during April, May and June, and then to the grass fields for the range season.

Such houses are almost indespensable to the person who raises few or many chickens. Their use removes many of the obstacles that tend to annoy and defeat chicken raisers.

Each house is 12 feet long and 7 feet wide. The front wall is 6 feet 2 inches high, and the back 4 feet 2 inches high from floor to roof, inside. This allows a full grown person to stand erect in the front part of the house. The two shoes on which it is built are 4 by 6 inches in size and lie flat. Their ends are chamfered on the under side so as to give them a sled runner turn. They are 14 feet long, and extend a foot outside of each end of the building. An inch auger hole slanting backward, and outward, is bored through each end of the shoes. For convenience in moving the houses, a short chain with an eye bolt in each end, which can be slipped through the auger holes and keyed, is used.

The floors are of two thicknesses of boards, breaking joints so as to preent the air from drawing through. The walls and roof are boarded and covered with one of the better qualities of sheet roofing materials. A door 2 feet wide and 6 feet high is placed in the center of the front wall with a window on each side of it. Each window contains 6 lights of 10 by 12 glass in one sash. It is hinged at the top and turns out, like an ordinary storm window. It is either closely buttoned down, or held open at different spaces, by hooks of various lengths. The longest opening is a foot, which leaves the window slanting out at an angle sufficient to give plenty of fresh air in warm weather when both windows are open, and the house full of birds. The advantages of hinged, over sliding windows, are that in stormy weather, rains and winds do not beat in to wet or annoy the birds, and free ventilation is not interfered with. The window openings are covered with wire netting on the inside. A slide door, a foot square, is made down at the floor, near each end of the front of the building, for the chicks to pass through. A temporary board partition about 15 inches high divides the building crosswise into halves. Two No. 4 Peep-O'-Day brooders * are used in each of these houses. They are put about 2 inches away from the back wall so as to allow the free passage of air to the intake openings in the sides of the brooders. They set about a foot away from each end of the building, and this space is filled in with an elevated platform and incline, which allows the chicks to go out through the brooder door and down a broad easy grade to the floor. The Peep-O'-Day brooders * are all made alike, with the lamp door at one side and the chick door at the other. They are located so that the lamp doors are towards the middle of the building and about 4 feet from each other, which gives about 2 feet between the lamp door and the temporary partition, sufficient room in which to attend to the lamps. The hinges to the brooder cover are put at the back, which allows the cover to turn up against the back wall out of the way.

These portable brooder houses are well made, of good material, and if the shoes are kept blocked up from the ground, they should last as long as other farm buildings. When they are drawn to the range for the warm season, they are turned back to the south, so that the sun may not shine in the windows to heat the house and make it uncomfortable for the birds. Facing the north, the houses furnish good cool shelter during the heat of the day.

The houses which the pullets occupy are blocked up about a foot and a half and the open space between the house and the ground gives cool shelter which the birds enjoy. The pullets do not trouble about going under the house to spend the night, but the cockerels do, and we find it necessary to board around the cockerel houses and deny them the cool retreat. As the cockerels develop in September and October, they become quar-

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* No extended tests of incubators, brooders, and other appliances have been made at the Maine Station. In this bulletin the makes that are in use at this Station are named. These may not be the best of their classes but have worked satisfactory here.

relsome and there are bullies among them, at every house, that domineer over their mates during the day, and stand guard at the doors at dark. With such fellows in the way it is difficult getting the underling into the house at shutting up time at night, if they have a chance to skulk under the building.

When the houses are drawn to the fields, they each contain from 50 to 75 pullets, as they are relieved of their brothers who are taken out and put into the fattening pens a few days previously. If the houses are located near to each other the chickens are liable to collect in some of them at nightfall and neglect others as the season advances, but if the houses are separated from each other by a distance of 100 feet, or thereabouts, the birds keep, for the most part, to their own homes.

When the houses are drawn to the fields, small yards about 12 feet square are made in front of them, in which the birds are confined for a few days, so as to get them acquainted with the new location of their homes, rather than let them go out into the new neighborhood at once, with the liability of their getting confused and lost.

A wagon load of fine sand is deposited at one end of each house on the ground, and 2 or 3 shovelfuls of it are spread on the floor each day as soon as the houses are cleaned out.

There is nothing in the houses on which the young things can roost and they all have to sit on the floor until their breast bones are hard enough so that they will not become crooked by pressing on the roosts while the birds are young and soft. Sometimes sitting on the floor will cause the breast bones of fast growing, fleshy chickens to crook. This condition may be prevented by bedding the houses with a little straw or chaff.

The daily cleanings from the floor are put into barrels which stand at the ends of the buildings, out of door, and as often as necessary the barrels are drawn to the fields, emptied of their contents, and returned for use again. Care is exercised that none of the floor cleanings are spilled near the houses to contaminate the ground and make it unsanitary. A rain storm or considerable shower will cause the partially filled barrels of manure to ferment and the odor from it is very strong and disagreeable. Whenever this occurs the barrels should be emptied without delay. We know that mites breed and multiply in fermenting poultry voidings, and we have much reason for believing that hens and chickens are annoyed by certain rank odors, sometimes so much so that they will abandon their homes for more decent ones.

UTILIZING THE BROODER HOUSES DURING WINTER.

These houses are used by chickens from about the first week in April to the last of October. The rest of the year—from November to April—they have not been used. At Go-well Farm, last October, when the houses were empty, a temporary roost platform about 6 feet long and 2 feet wide was arranged inside, along the back of each house. It was 2½ feet above the floor, and a curtain, made from bran sacks was hung in front of the platform to shut it off from the rest of the room so it might be warmer during the night. The curtain had a stick nailed to its lower edge and was readily hooked up during the day time to allow the bedroom to dry out. There were no roosts on the platform. The birds just sat down on it, as it was thought they would keep warmer in this way than if on elevated roosts. Six darkened nests were arranged under the platform. A feed trough was hung on the wall within easy reach of the birds. It had separate places for bone, shell, grit, charcoal, and the dry meal mixture. These fixtures were coarse, yet strongly made, so that they could be removed in the spring and put in again the following fall without much tearing apart and remaking. One of the windows was opened out and hasped, leaving a space a foot wide at the bottom, and triangular shaped at the sides. This space, at the sides and bottom of the window, was covered with one thickness of burlap, taken from bran sacks. It was fastened to the sash and building by carpet tacks. The air could pass through the burlap and ventilate the room during nights and stormy days, and the snow or rain could not sift or beat through it into the house. The other window was shut during nights, but it was kept turned up—wide open—all days when the weather was not stormy, or dark and severely cold.

Sixteen of the houses were fixed up in this way and drawn up handy to the barn. They were put end to end about 2 feet apart—as near as the projecting runners would permit. Seventeen pullets were put in each house the first of November and kept there without going out of doors during the winter. Each 100 birds were fed 2 quarts whole corn and 2 quarts wheat mixed together, on the floor litter early in the morning, and again at 10 o'clock. They were constantly supplied with the dry mash, bone, shell, grit and charcoal with limited quantities of mangolds. The bedding kept dry and the birds were in good health and vigor. Eleven of the 272 birds thus housed died during the winter. The pens were very small and the population dense—4¼ feet of floor surface to each bird. They did not lay as well as their sisters in any of the pens in the large house and there was some egg eating, which reduced their record yields.

The houses had to be available for brooder chicks early in April, so the hens were dressed and marketed the first of that month and the houses were thoroughly cleaned and painted inside, with kerosene and carbolic acid, to destroy any lice that the hens might have left.

During the 5 months—November 1 to March 31—the birds yielded 1057 dozen eggs, which, had we no other market for them, would have sold in the open Boston market at 33 cents per dozen net easily, yielding $348. The food eaten by these birds during the period cost $175 which leaves a balance of $173 to pay for their care. While $173 is not a great amount of money, it paid well for the labor required in caring for the birds, which was done in connection with other work. The houses were not noticeably injured by their winter's use. The birds when dressed and sold brought as much money as they would have done in the previous October, including those that were lost.

The reasons for this test were to learn if these small houses, which are used only in summer as homes for growing chickens, could be utilized during winter with some profit.

HOUSES FOR THE LAYING AND BREEDING HENS.

Two styles of houses are in use at the Station. One is a thoroughly made double walled building, 16 by 150 feet in size. It is always kept above freezing by a water heater and a flow and return, two-inch pipe, running the length of the building. This building was constructed with special reference to comfort, health and productiveness. Small, well made houses with single walls had formerly been in use, but they would get white with frost in cold weather, if shut up close enough so the birds did not suffer from cold during winter nights. When the weather moderated the white frost would change to water and the straw litter on the floor would become damp and clammy. The birds showed their dislike for the damp straw by keeping off from it as much as they could. Such houses were unsatisfactory, and so the large warmed house was built. It was a decided improvement over the cold ones, because it could be ventilated and the birds not suffer with the cold. But it was not possible to secure sufficient ventilation, even though the house was moderately warmed, to prevent the presence of considerable moisture in the bedding.

Good yields of eggs were obtained from hens kept in that house and the losses of birds were not excessive. The hens showed, however, that they were not in the best condition, by a little lack of color in comb, and energy in action. This house has not been abandoned, and is highly prized for laying hens. Since breeding cockerels cannot be carried in the other houses, without danger of chilled combs, they are wintered in this warmed house until danger from chilling is past.

In seeking for some better system of housing the birds one of the small close houses, formerly used, was changed into an open house. The building was 10 feet wide and 25 feet long. An opening 3 feet wide and 15 feet long was made close up under the plate, and was left open every day in winter, except when the snow or rain blew in. At night the opening was covered with a framed curtain made of cotton cloth. An elevated roosting closet along the entire length of the back of the building was made warm, by packing the walls with hay. A close fitting frame-cloth curtain shut them in at night.

It did not freeze in the closet and the birds apparently did not suffer from lack of air. They seemed to enjoy coming out of the warm sleeping closet, down into the cold straw, which was never damp, as the whole house was open to the outside air and sun every day. There were no shut off corners of the floor, or closet that were damp. This building was used through three winters with 50 hens in it each year and did not have a sick bird in it. Not a case of cold or snuffles developed from sleeping in the closet with it's cloth front, and then going directly down into the dry straw, in the cold room, and spending the day in the open air.

The birds laid as well as did their mates in the large warmed house. Their combs have been red and plumage bright and they have given every evidence of perfect health and vigor. While they are on the roosts they are warm. They come down to their breakfasts and spend the day in the open air. Such habits of life seem to work equally well with brute or man.

After having used this so-called Pioneer house one year, a house was constructed 12 feet wide and 68 feet long. Its front and back walls were 5 feet high and the roof was evenly divided. It was divided into two rooms, each 34 feet long. The elevated roosting closets extended along the entire backs of each room and they were constructed in the same manner as the one in the Pioneer house. The partition between the 2 rooms was made of 2 inch mesh poultry netting. There were 4 openings in the front of the building, 2 in each room, equal distances apart. Each opening was 3½ by 8 feet in size, fitted with frame cloth curtains, to be used only on winter nights and stormy days, in the same way that they were in the Pioneer house. These openings were put close up to the plates and came down to within 1½ feet of the floor. There were no glass windows in the building.

This house was not satisfactory. There were currents of air from one end of the building to the other, even when there was little wind outside, and when the wind was high in winter the loose snow would be sifted in and distributed over a large part of the floor, dampening the litter and making life uncomfortable for the birds. The wire partition between the pens was replaced with one of close boards, and conditions were bettered; but each of the pens still had 2 openings, about 8 feet apart, and the same troubles from currents of air and sifting of snow continued, although somewhat lessened. One of the openings was closed by screwing glass windows on the outside. This left each of the rooms with one opening and one large glass window.

This change entirely corrected strong air currents through the building and sifting snow, except in heavy storms when the wind is strong from the south. Of course the large opening allows the wind to blow into the room, but as there is no outlet for it except where it came in, there are no drafts of air across the birds to cause them to be uncomfortable and take colds.

Another difficulty remained; the opening came down to within 1½ feet of the floor, and the birds, sunning themselves on the floor or scratching in the litter, were in the direct course of the outside air as it came into the room and they tried to find sheltered corners where they might be more comfortable. On this account the width of the opening was reduced from 3½ feet to 2 feet by ceiling up the lower part of it. This gave a bulkhead 3 feet high, sufficient to protect the birds on the floor from the direct inflow of out door air, and they were happy.

One objection to this house still remains; its front wall is too low to allow room for a large opening, high enough so that the sun can shine in and back across the floor to the back wall during the short days in winter, when the sun runs low. This feature in construction, seems to be of the utmost importance, for dependenec is had upon the sunshine and pure outside air, to keep the floor litter dry and the elevated roosting closet clean. The entire front of the roosting closet being open, leaves no dark corners where the air and light cannot do their thorough cleansing.

Experience with the house showed its several bad features. On the other hand, the Pioneer house, which had been in use for three years, gave great satisfaction, and the same general plan was adopted in the construction of a large house.

This house designated as House No. 2, was built 4 years ago. It is 12 feet wide and 150 feet long and is divided into 7, twenty feet sections. In each section, with its floor surface of 240 feet, 50 pullets have been wintered each year, most successfully.

Three years ago another house was built on the same plan, except that it is 16 feet wide instead of 12. It is 120 feet long and consists of 4 sections or houses, each 16 by 30 feet in size. There is no separate walk through the building, but in the close board partition separating the pens, are doors, hung with double acting hinges, which allow them to swing both ways, and close automatically, after the attendant passes through. Each pen has a floor surface of 480 feet and gives ample accommodation to 100 hens. All of the hens in these 2 open front houses, in flocks of 50 or 100, averaged laying about 144 eggs each last year, and the birds were in excellent health. The front curtains were open all of the time every day, except the stormiest in winter.

While the same plan is common to all of these open front houses, the width has been increased in each succeeding one built. The first house was 10 feet wide, the second 12 feet, the third 16 feet in width. The house which Professor Gowell

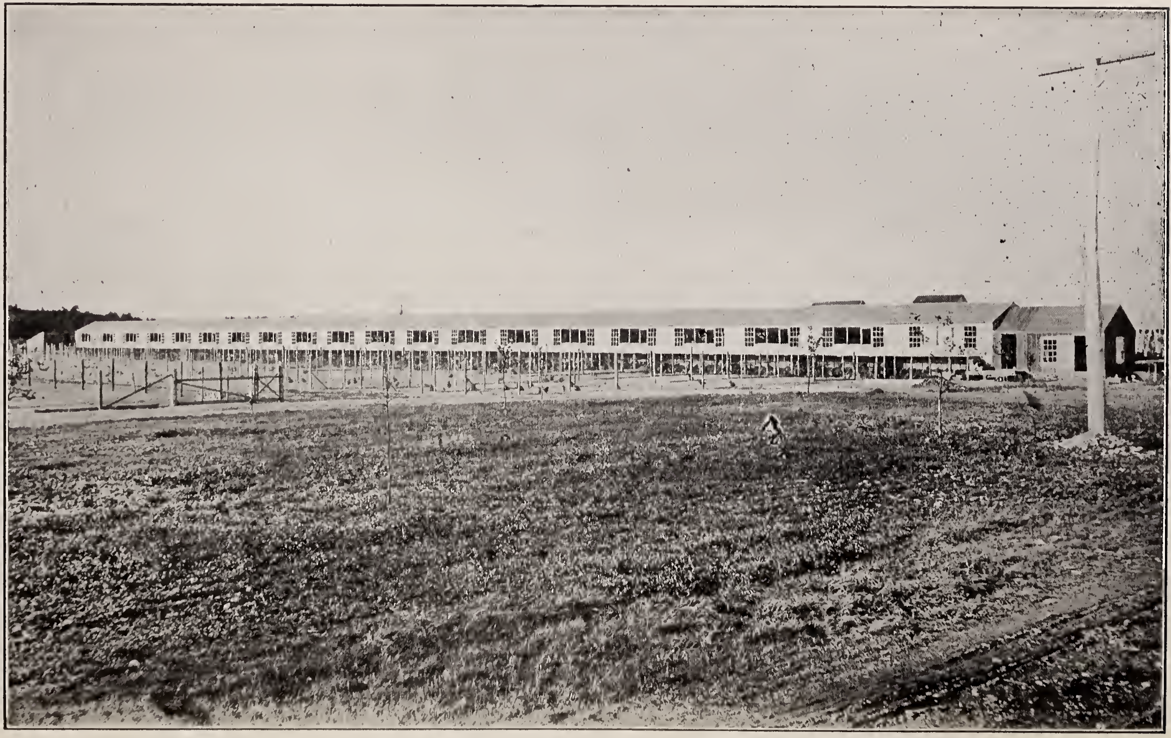

Figure 19. Laying and breeding house at Go-well farm. See page 159.

erected at his farm is 20 feet wide and is the best one with which we are acquainted as it is typical of those already described, and in addition embodies other features which make it more comfortable for the birds and lessens the labor required in their care.

During the summer of 1905 a laying house was built to accomodate 2,000 hens. It is 20 feet wide and 400 feet long. It is on the same general plan as House No. 2 and 3 at the Experiment Station. House No. 2 is 12 feet wide; House No. 3 is 16 feet wide, and this one at Go-well farm is 20 feet wide. The widths have been increased in the last 2 houses, as experience has shown the advisability of it. At first it was thought that the houses should be narrow so they might dry out readily, but the widest house dries out satisfactorily as the opening in the front is placed high up, so that in the shortest winter days the sun shines in on the floor to the back.

Nearly 2 years use of this wide house shows its advantage over the narrow ones to be greater than was anticipated when it was planned. Its great width and the low down door in the back wall make it much cooler in hot weather.

During July and August the birds go into the yards early in the morning but they nearly all come back into the house as the day gets warm, and remain on the floor in the back part of the room, apparently enjoying the shade and the cool air which draws across the floor, even when the air seems very still outside.

The differences in the temperature of the wide and narrow houses is very great, and the birds show what they think about it by staying in the yards in preference to the narrow houses. Of course, the comfort of the birds is not greater than when they have good shade out of door but the runs have not trees or shrubs sufficient to furnish shelter.

The economy in the cost of the wide house over the narrow ones, when space is considered, is evident. The front and back walls in the narrow house cost about as much per lineal foot as those in the wide house, and the greatly increased floor space is secured by building in a strip of floor and roof, running lengthwise of the building. The carrying capacity of a house 20 feet wide is 66 per cent greater than that of a house 12 feet wide, and is secured by building additional floor and roof space only. The walls, doors and windows remain the same as in the narrow

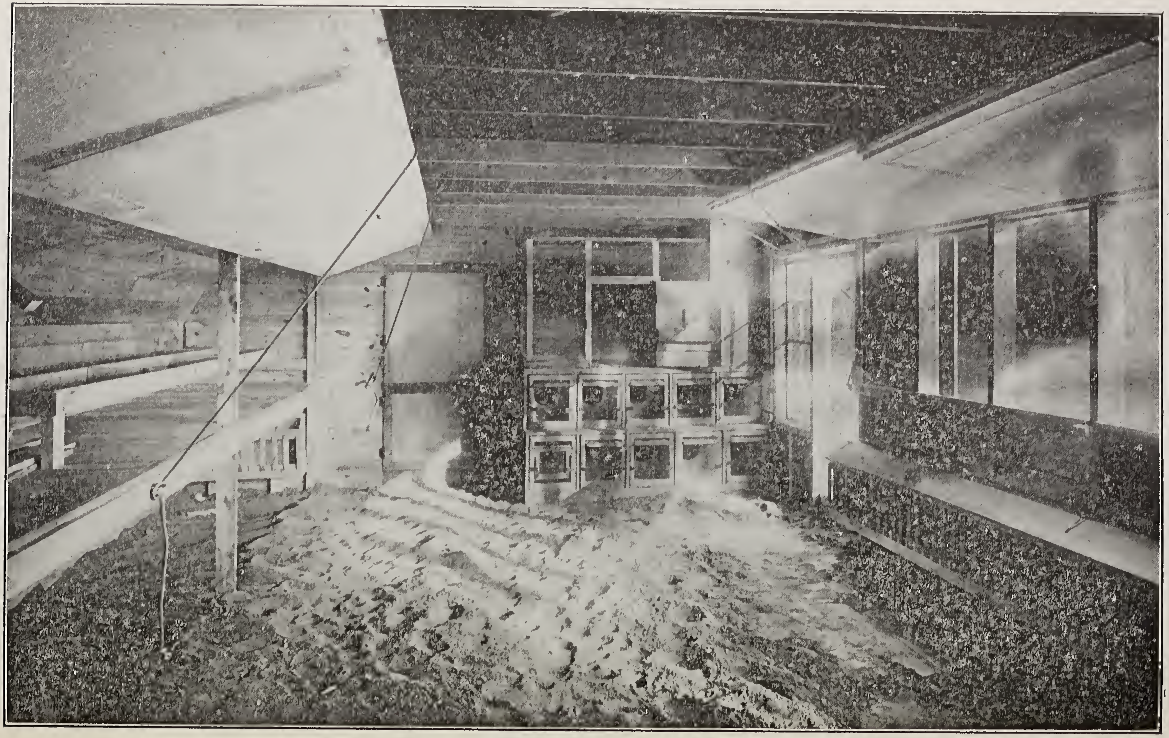

Figure 20. Interior of one section of curtain front house. See page 162.

house, except that the front wall is made a little higher. Three sills which are 6 inches square run lengthwise of the house, the central one supporting the floor timbers in the middle. They rest on a rough stone wall, high enough from the ground so that dogs can go under the building to look after rats and skunks that might incline to make their homes there. The stone wall rests on the surface of the ground. The floor timbers are 2 by 8 inches in size and rest wholly on top of the sills. All wall studs rest on the sills; the front ones are 8 feet long and the back ones 6 feet 6 inches long. The roof is unequal in width, the ridge being in 8 feet from the front wall. The height of the ridge from the sill to the extreme top is 12 feet 6 inches. All studding is 2 by 4 in size and the rafters are 2 by 5. The building is boarded with inch boards and papered and shingled with good cedar shingles on walls and roof. The floor is of 2 thicknesses of hemlock boards, which break joints well in the laying.

The building is divided by tight board partitions into 20 sections, each section being 20 feet long. All of the sections are alike in construction and arrangement. The front side of each section has two windows of 12 lights of 10 by 12 glass, screwed on, upright, 2 feet 8 inches from each end of the room. They are 3 feet above the floor. The space between the windows is 8 feet 10 inches long, and the top part of it down from the plate, 3½ feet, is not boarded, but left open to be covered by the cloth curtain when necessary. This leaves a tight wall, 3 feet 10 inches high, extending from the bottom of the opening down to the floor, which prevents the wind from blowing directly on to the birds when they are on the floor. A door is made in this part of the front wall for the attendant to pass through when the curtain is open. A door 16 inches high and 18 inches wide is arranged under one of the windows for the birds to pass through to the yards in front. It is placed close down to the floor. A similar door is in the center of the back wall to admit them to the rear yard when that is used.

A light frame, made of 1 by 3 inch pine strips and 1 by 6 inch cross ties, is covered with 10 ounce white duck, and hinged at the top of the front opening, which it covers when closed down. This curtain is easily turned up into the room where it is caught and held by swinging hooks until it is released.

The roost platform is made tight and extends along the whole length of the room against the back wall. It is 4 feet 10 inches wide and 3 feet above the floor, high enough so that a person can get under it comfortably when necessary to catch or handle the birds. There are three roosts framed together in two 10 feet sections. They are one foot above the platform and hinged to the back wall so they may be turned up out of the way when the platform is being cleaned. The back roost is 12 inches from the wall, and the spaces between the next two are 16 inches. They are made of 2 by 3 inch spruce stuff, placed on edge, with the upper corners rounded off. The roosting closet is shut off from the rest of the room by curtains, similiar to the one described above. For convenience in handling, there are 2 of them, each 10 feet long. They are 3 feet wide and are hinged at the top so as to be turned out and hooked up. The space above this curtain is ceiled up and in it are two openings each 3 feet long, and 6 inches wide, with slides for ventilating the closet when necessary. There is a door in every partition, placed 5 inches out from the edge of the roost platform. They are 3 feet wide and 7 feet high; they are divided in the middle, lengthwise, and each half is hung with double acting spring hinges, allowing them to swing open both ways, and close.

Ten nests are placed against the partition in each end of the room, in 2 tiers. They are of ordinary form, each nesting space being one foot wide, one foot high and 2 feet long, with the entrances near the partition, away from the light, and with hinged covers in front for the removal of the eggs. Each section of 5 nests can be taken out, without disturbing anything else, and cleaned and returned. In constructing the house it was designed to use these nests only one year. At the end of that time they were removed and 400 trap nests substituted for them.

Troughs are used for feeding the mixtures of dry meals, shell, bone, grit and charcoal. The bottoms are made of boards 7 inches wide; the ends being of the same width and 18 inches high. The back is of boards and the cover is of the same material and slopes forward sufficiently so the birds cannot stay on it. A strip 5 inches wide is nailed along the front edge of the bottom to make the side of the trough. Pieces of lath are nailed upright on the front, 2 inches apart, between which the hens reach through for the food. A thin strip 2 inches wide is fastened to the front of the trough at an angle of about 45 degrees to catch the fine meal that the birds pull out and would otherwise waste. They clear it up from this little catchall and so waste is mostly prevented.

Two lines of 4 by 4 inch spruce are arranged as an elevated track above the doors. The track extends the entire length of the building and being faced with narrow steel bands on top, a suspended car is readily pushed along, even when heavily loaded. The platform of the car is 2 by 8 feet in size and is elevated a foot above the floor. All food and water are carried through the building on this car. The 10 iron baskets, into which the roost platforms are cleaned every morning, are put on the car and collections made as the car passes through the pens to the far end of the building, 400 feet away, where the roost cleanings are dumped into the manure shed. As the car is pushed along, the guard at the front end comes in contact with the doors and pushes them open and they remain so until the car has passed through, when the spring hinges force them to close again. This car is a great labor saver as it does away with nearly all lugging by the workmen. It has enabled one man to take good care of the 2,000 hens throughout the year, except on Saturdays when the litter has been removed and renewed by other men.

At one end of the building there is a temporary food and water house for dish washing and scalding and where the car remains when not being used.

There is a walk outside of the building extending along its entire front. It is 4 feet wide and is made of 2 inch plank; it is elevated 2 feet above the floor of the building, which allows the doors, through which the birds pass to the front yards, to be opened and closed without interferences. The door which opens out of each room through the curtain section, is above the outside walk and necessitates stepping up and down when passing through, which is not a very serious objection, as the door is used but little in the daily work, but mostly in cleaning out and renewing the floor litter. A guard of wire poultry netting, a foot wide along the outside of the walk, prevents the birds from flying from the yards up to the walk. The advantage of the elevated walk, over one on a level with the sill of the building is that it is unobstructed by gates, which would be necessary were the low walk used, to prevent the birds from passing from one yard to another.

YARDS AND GREEN FOOD.

The yards conform in width to the 20 foot sections of the house and are 100 feet deep. The fence is 5 feet high and is made from 2 strips of 2 inch mesh No. 19 poultry netting. By using 2 strips of 30 inch width, instead of one strip double that width, 2 strong lines of wire are brought in the middle and the liability of bagging is much lessened, while the cost is not increased.

To give free passage for teams near the door of the building, openings 12 feet wide are left in the yard fences. They are 15 feet away from the front of the building, so that the road may not be obstructed with snow which is liable to accumulate near the building. The frame fence sections, which fill in the openings during the summer, are quickly taken out and replaced on cleaning days, and the delivery of bedding and worn litter, back and forth, from wagon to buildings is very directly made.

When these yards were constructed it was the intention to arrange others corresponding to them in size and shape, in the rear of the building, but experience with the wide house, and observation of the yards as a source of green food has been such as to cause the abandonment of the plan of double yards. It was thought that 2 yards, to be used in alternation by the birds, frequently cultivated and reseeded, would furnish sufficient green food in summer, but 100 birds in yards of this size soon wear out and foul the young plants to such an extent that they eat very sparingly of the green stuff until the storms or showers wash the plants clean again.

Being satisfied that the birds were not getting green food enough in the yards last spring, young alfalfa as soon as it was tall enough so it could be mown with a scythe, was cut and then run through a feed-cutter. A peck measure was pressed full of this and fed to 100 hens in the A. M. and another peck of it was given to them in the P. M. They ate practically all of it, until the plants commenced to get woody. When clover was large enough to mow that was fed to them in the same way. They evidently relished the clover better than the alfalfa, but the alfalfa has the advantage of being ready to use before the clover has made growth enough to cut.

Feeding the clover was continued until the greenest spots were nearly all out of bloom. At that time young clover from a field that was seeded on the frozen ground in March was tall enough to cut, and when that was too mature to use, the second crop, from the field of clover first used, was available. This method of supplying green food proved so satisfactory for confined hens that the practice will be continued. Of course, considerable labor is involved in bringing the clover from the fields and feeding it to the hens, but it makes certain an adequate supply of fresh, clean, appetizing green food every day, which it has never been possible to get continuously from the yards. The labor involved in cultivating and reseeding the yards, which must be done frequently in order to have them at all satisfactory, is saved, as is also the expense of maintaining fences about the extra yards.

Clover is the most satisfactory green food that the Station has used and the expense of growing it need not be great, as small areas will furnish enough for liberal feeding. The supplies of it should be constant, and that there may be no shortage between the first and second crops in the regular clover fields, small tracts of land can be seeded on the frozen ground early in the spring and the clover be large enough for use when needed to keep good the supply.

Dwarf Essex rape has also been satisfactorily used for green food for growing chickens in the open field. If the land is rich and the weather not too dry it springs up quickly after having been fed down, when the birds are removed for a few days, and it is soon ready for grazing again. Its use has been abandoned for laying hens as apparently it gives the yolks of some of the eggs a greenish color when they are boiled. No trouble of this kind was noted before beginning the feeding of rape, and none after its use was discontinued.

Experience with the wide, open front house is in favor of yards on the north rather than on the south side of the building. With the open front houses it is not necessary to get the hens out into the sunny south yards as soon as spring comes, as they are really out in the open air and sunshine, when on the floor, within the walls of the building, by means of the large open section in the front wall. On hot days in summer the front yards become very uncomfortable, from the sun shining on the front of the building, and the birds retreat into the house for shelter or go into the back yards and sprawl on the ground as close to the building as they can. With no front yard fences

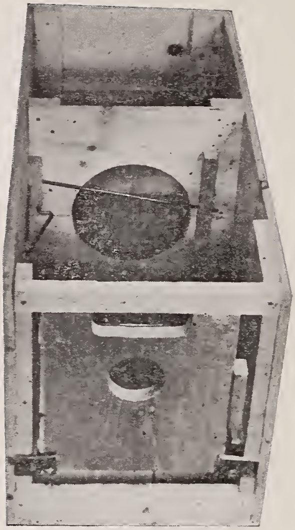

Figure 21. Trap nest from above. See page 171.

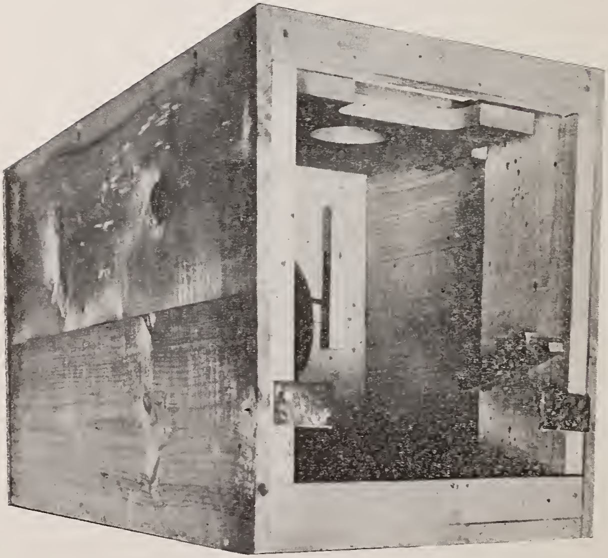

Figure 22. Trap nest, door open. See page 171.

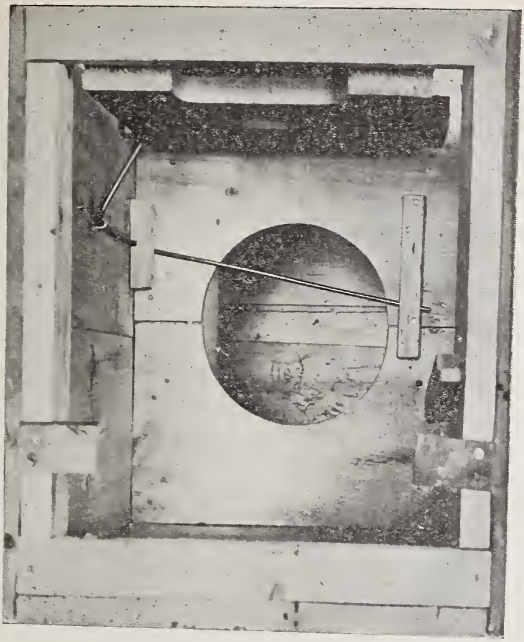

Figure 23. Trap nest, note trip wire. See page 171.

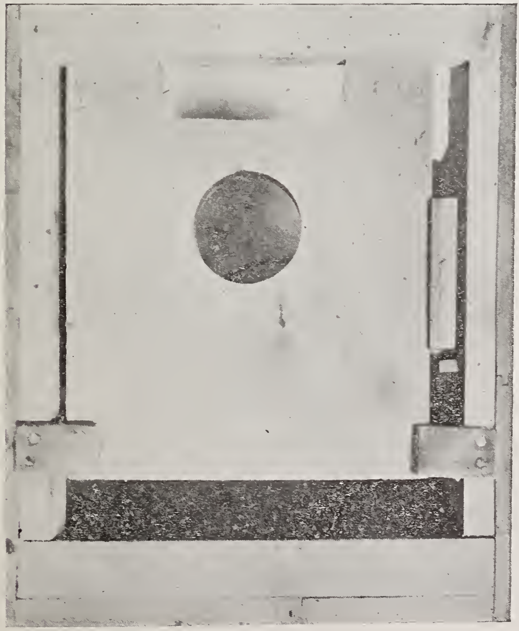

Figure 24. Trap nest, door closed. See page 171.

in the way the removal of the old litter, and the renewal of the bedding, would be much more quickly and easily done, as the teams could be brought close to the walk in front of the building.

THE MAINE STATION TRAP NEST.

This trap nest is original with us; it is a box-like structure without front end, or cover. It is 28 inches long, 13 inches wide and 16 inches deep, inside measurements. A division board with a circular opening 6 inches in diameter is placed across the box, 12 inches from the back end and 15 from the front end. The lower edge of the 6 inch opening in the division board comes down to within 4 inches of the floor of the box. The rear section of the box is the nest proper.

The double box with nest in its rear is necessary, as when a hen has laid and desires to leave the nest, she steps out into the front space and there remains, generally trying to escape, until she is released. With one section only she would be very likely to crush her egg by stepping upon it, and learn the pernicious habit of egg-eating.

The door is made of seven-eighths inch pine board. It does not fill the entire front, by 2 inches at the bottom and one inch at each side. A hole 2½ inches in diameter is bored in its center, to admit more light. For the same purpose a section is cut out of its upper end, leaving enough of the board at each side of the opening to extend up to the cross piece and hold the hinges, which are made of leather, tacked on the inside of the door and the top cross-piece.

The trip latch is made of a piece of stiff wire, about three-sixteenth of an inch in diameter and 23 inches long. This piece of wire is shaped so that a section of it, 12 inches long, rests horizontally across the circular opening in the division board, leaving about two-thirds of the 6 inch opening below it. It is held in place by 2 clamps, one on either side of the circular opening. The clamps have slots large enough to allow the wire to work up and down, about 3 inches, without friction. The next section of the wire is 8 inches long and is bent so that it is at right angles with the 12 inch section. It passes along the side of the box, back towards the entrance door. It is fastened strongly to the wall by staple and clamp, yet loosely enough so that the wire can roll easily, when its 12 inch section is pushed up by the passing hen. The remaining section of the wire, which is 3 inches long, is bent towards the center of the box with an upward inclination, so that it supports the door when opened up. The end of the wire is turned over smoothly, forming a notch into which the door slips, and rests when it is opened. The notch prevents this section of the wire from sagging under the weight of the door and interfering with the free action of the latch. It is necessary that the wire from which the latch is made be of good stiff material, so it will not bend or spring much.

As the hen passes in under the open door, and then through the circular opening of the nest, she raises herself so that her keel may pass over the lower part of the division board, and her back presses against the horizontal wire, lifting it enough as she passes so that the notched end supporting the door, slides from under it, and the door swings down and passes a balanced catch which is screwed loosely to the side of the box. The catch locks the door and prevents the hen from escaping, and others from entering.

These nest boxes are placed in two rows, one above the other, and slide in and out like drawers and can be carried away for cleaning when necessary. Twenty nests in a pen accommodate 100 hens, by the attendant going through the pens once an hour, or a little oftener, during that part of the day when the hens are busiest. Earlier and later in the day his visits have not been so frequent. To remove a hen, the nest is pulled part way out, and as it has no cover she is readily lifted up, and the number on her leg band noted on the record sheet, that is tacked up close at hand. After having been taken off a few times they do not object to being handled, the most of them remaining quiet, apparently expecting to be picked up.

Before commencing the use of trap nests, it was thought that some hens might be irritated by the trapping operation and object to the noise incident to it, but not an individual has appeared to be annoyed by it, and Leghorns, Brahmas, Wyandottes and Plymouth Rocks have been used.

The amount of time required in caring for trap nests depends upon how heavily the hens are laying. In one house there are 400 nests used by 2000 birds. During the busy season when 1200 to 1500 eggs are laid per day, the work of liberating the hens and recording the laying, requires the full time of an active man, during the busiest 4 or 5 hours of the day. During the remaining hours he has some time for other work.

The nest is certain in its action, easy of operation and simple in its construction. It is not patented. We do not sell it. Any one is free to make it.

FEEDING YOUNG CHICKENS.

The chicks are allowed to remain in the incubator without food until they are about 48 hours old. They are then strong, steady on their legs and hungry.

The temperature under the brooder hover is kept between 95 and 100 degrees during the first week; reducing it about 5 degrees during each of the next 2 weeks. The chicks must not be allowed to chill while young, day or night. After they are 3 or 4 days old, they are taught, little by little, the road down, and out on the floor, which is covered with a little sand and a little dry cut clover, or clover leaves and chaff.

The best method of feeding young chicks is at present a matter of some uncertainty and it is doubtful if ever there will be general agreement as to the one best method. One condition appears to be imperative and that is that the young things be not allowed to over-eat. During the past years we have practiced several different methods of feeding chicks quite extensively, and have observed the results carefully.

Method 1.

Infertile eggs are boiled for half an hour and then ground in an ordinary meat chopper, shells included, and mixed with about 6 times their bulk of rolled oats, by rubbing both together. This mixture is the feed for 2 or 3 days, until the little things have learned how to eat. It is fed with chick grit, on the brooder floor, on the short cut clover or chaff.

About the third day they are fed a mixture of hard, fine broken grains, as soon as they can see to eat it in the morning. The mixture consists of equal parts of cracked corn, cracked wheat, millet seed and pin-head oats. It is fed on the litter, care being taken to limit the quantity, so they shall be hungry a 9 o'clock A. M. Several of the prepared, dry, commercial chick foods may be substituted for the broken grains. They are satisfactory when made of good, clean, broken grains and seeds, but they contain no secret properties that make them more desirable than the home mixed broken grains mentioned above. Their use is simply a matter of convenience. When only a few chicks are raised it is generally more convenient and probably not more expensive to buy the prepared food, but when many are raised it is less expensive to use the home mixed foods. Sharp grit, fine charcoal and clean water are always before them. At 9 o'clock the rolled oats and egg mixture is fed in tin plates with low rims. After they have had the food before them 5 minutes the dishes are removed and they have nothing to lunch on. At 12.30 o'clock the hard grain mixture is fed again, as in the morning, and at 4.30 or 5 o'clock, they are fed the rolled oats and egg mixture, all they will eat in half an hour.

When they are about 3 weeks old, the rolled oats and egg mixture is gradually displaced by a mixture made up of 2 parts by weight of good clean bran, 4 parts corn meal, 2 parts middlings or red dog flour, 1 part linseed meal and 2 parts screened beef scrap. This mixture is moistened just enough with water so that it is not sticky, but will crumble, when a handful is squeezed and then released. The birds are developed far enough by this time so that the tin plates are discarded for light troughs with low sides. Young chicks like the moist mash better than though it was not moistened, and will eat more of it in a short time. There is no danger from the free use of the properly made mash, twice a day, and being already ground the young birds can eat and digest more of it, than when the food is all coarse. This is a very important fact and should be taken advantage of, at the time when the young things are most susceptible to rapid growth. But the development must be moderate during the first few weeks. The digestive organs must be kept in normal condition by the partial use of hard foods, and the gizzard must not be deprived of its legitimate work and allowed to become weak by disuse.

By the time the chicks are 5 or 6 weeks old, the small broken grains are discontinued and the 2 litter feeds are wholly of screened cracked corn and whole wheat. Only good clean wheat that is not sour or musty should be used.

When young chicks are fed as described the results have always been satisfactory, if they have not been given too much of the scratch food, and the dishes of ground material have been removed immediately after the meal was completed. The objections to this system of feeding are the extra labor involved in preparing the eggs, mixing the food with water and removing the troughs at the proper time.

There is no danger of underfeeding even though the morning and noon feeds of hard grains should be scanty for the birds have free access to supplies of food, in the troughs, twice a day, sufficiently long to get full meals.

Method 2.

This is like Method I, except that fine beef scrap is used instead of boiled eggs, and the mash is not moistened.

Early in the morning the chicks are given the hard food on the floor litter as described in Method I. At 9 o'clock they are fed a mixture consisting of 2 parts rolled oats, 2 parts wheat bran, 2 parts corn meal, 1 part sifted beef scrap and one-half part linseed meal. This is given in the plates or troughs and the dishes are removed after 10 minutes use.

At 12.30 the hard grains are fed again and at 4.30 or 5 the dry meal mixture is given to them for half an hour or left until their bed time. The meal being dry the chicks cannot eat it as readily as they can the egg and rolled oats, or the moistened mash, and for that reason it is left for them to feed upon longer than when moistened with the egg and water, but is never left before them more than 10 minutes at the 9 o'clock feeding time. The aim is to give them enough at each of the 4 meals so that their desire for food may be satisfied at the time, but to make sure that they have nothing left to lunch upon. It is desired to have their crops empty of food before feeding them again. When treated in this way they will have sharp appetites when the feeder appears, and come racing out from the brooder to meet him. If they have been over-fed at the previous meal, and have lunched along, when they saw fit, they do not care for the feeder's coming. If over-fed a few times the creatures become debilitated and worthless.

What has been said so far is with reference to chicks that are hatched out in early spring before the young things can get out of doors for work.

Method 3.

When warm weather comes and the later hatched chicks are able to get out on the ground they find much to amuse them, and they work hard and are able to eat and digest more food. Under these conditions the dry meal mixture described in Method II is kept constantly before them in troughs with good results. With 2 feeds a day of the broken grains in the litter they have hard food enough to insure health and they can safely peck away at the dry meal mixture—a mouthful or two at a time—when they seem to happen to think of it, and thrive. This method has been considerably used in feeding April and May hatched chicks. Many times the results from it have been good. At other times, when the weather was dark and raw out of doors and the little things were held inside, they would hang around the troughs and over eat. They would grow rapidly for a few days, then commence to cripple, eat little, and seek the warm hover never to recover.

Method 4.

This consists in feeding the cracked corn, cracked wheat, pin head oats and millet seed in the litter, 4 times a day and keeping a trough of fine beef scrap within their reach all of the time. Sometimes commercial chick foods have been used instead of the cracked corn, wheat, oats and millet. By this system the losses of birds have been small when the feeding has not been so liberal as to clog the appetite. Much care is necessary in adjusting the quantity of food to the needs of the birds.

Other methods of feeding young chicks have been tried and the results watched. Method I has been used for several years and no other has been found that gives better growth or less losses of birds. The only objection to it is the labor required in preparing the food and cleaning the dishes after each meal.

In the work at this Station, Method II is preferred and used. Many weighings of the birds in comparative pens, lead to the belief that the growths are as great under this dry mash system as from the moist mash used in Method I. The losses of chicks are small by either method. The labor in Method II is considerably less than is required in Method I. Where either Methods I or II are used the liability of injury to the chicks is much less than when Methods III or IV are followed.

There are no mysteries connected with the raising of the young chickens. Every chick that is well hatched out by the 21st day of incubation, has the right to live, and it will do so if it is kept dry, at reasonable temperatures, and is not allowed to over-eat.

The most careful work of the poultryman during the whole year is required in getting the chicks through the first 3 weeks of their lives successfully. If they are vigorous up to the fourth week there is little liability of injuring them thereafter by any system of feeding, if it is only generous enough, and they have their liberty.

FEEDING THE COCKERELS FOR MARKET.

When the chickens are about 9 or 10 weeks old, and the cockerels weigh a pound and a quarter to a pound and a half, the cockerels are put by themselves into vacated brooder houses, 100 to a house. Each house has a yard in front, about 12 feet square. They are fed on porridge, 3 times a day, in V-shaped troughs, with 4-inch sides. The porridge is made of 6 parts corn meal, 2 parts middlings, one-half part linseed meal and 2 parts beef scrap. Not having milk, it is mixed with tepid water. It is made thick enough so that it will drop and not run, from the end of a wooden spoon. They are given all they will eat in half an hour, when the troughs are removed and cleaned. When the yards get dirty, they are bedded down with sand, straw or hay. The birds will stand this feeding for 2 or 3 weeks with good appetites. When they commence taking less food they are dressed for market and usually weigh about 2¼ pounds dressed weight.

GROWING AND DEVELOPING THE PULLETS.

When the cockerels are taken out for finishing, the pullets of the same age, are moved to the grassy range, still occupying the same portable houses in which they were raised. At this time the method of feeding is changed, and dry food is kept by them constantly, in troughs with slatted sides and broad detachable roofs, so it may not be soiled or wasted. The troughs are from 6 to 10 feet long, with the sides 5 inches high. The lath slates are 2 inches apart and the troughs are 16 inches high from floor to roof. The roofs project about 2 inches at the sides and effectually keep out the rain except when high winds prevail.

The roof is easily removed by lifting one end and sliding it endwise on the opposite gable end, on which it rests. The trough can then be filled and the roof drawn back into place without lifting it. This arrangement is the best thus far found, for saving food from waste and keeping it in good condition. When dry mash is used in it there may be considerable waste by the finer parts being blown away. When used for that purpose it is necessary to put it in a sheltered place out of the high winds.

In separate compartments of the troughs, they are given cracked corn, whole wheat, oats, dry meal mixture, grit, dry cracked bone, oyster shell and charcoal. The dry meal mixture is of the same composition as that fed to the laying hens, described on page 167. The troughs are located about the field in sufficient numbers to fully accommodate all of the birds.

The results of this method of feeding are satisfactory. The labor of feeding is far less than that required by any other method. The birds do not hang around the troughs and overeat, but help themselves, a little at a time, and range off, hunting, or playing and come back again, when so inclined, to the food supply at the troughs. There is no rushing or crowding about the attendant, as is usual at feeding time, where large numbers are kept together.

For the last 8 years the first eggs have been lain when the pullets were from 4 months and 10 days, to 4 months and 20 days old. There is some danger of the pullets getting developed and commencing laying too early for best results, under this system of feeding. In order to prevent such conditions, the houses should not be located too close to each other, or to the feed troughs, and a large range should be given them so they may be induced to work, which they will do if given the opportunity, early after their removal to the fields. Should the birds show too great precocity, and that they are liable to commence laying in August, the supply of cracked corn and wheat in the feeding trough is reduced, or taken away altogether, which causes them to eat the oats and dry meal instead, and they continue to grow and develop without getting ripe too soon.

During the last days of October the pullets are moved into the laying house. This would be done earlier but the houses are in use by the laying hens to near the end of that month.

FEEDING THE HENS.

Early in the morning for each 100 hens, 4 quarts of screened cracked corn* are scattered on the litter, which is 6 or 8 inches deep on the floor. This is not mixed into the litter, for the straw is dry and light and enough of the grain is hidden so the birds commence scratching for it almost immediately. At 10 o'clock they are fed in the same way, 2 quarts of wheat and 2 quarts of oats. This is all of the regular feeding that is done.

Along one side of the room is the fed trough, with its slatted front. In it is kept a supply of dry meals mixed together. This dry meal mixture is composed of the following materials: 200 pounds good wheat bran, 100 pounds corn meal, 100 pounds middlings, 100 pounds gluten meal or brewers' grain, 100 pounds linseed meal, and 100 pounds beef scrap.

These materials are spread on the floor in layers one above another and shoveled together until thoroughly mixed, then kept in stock, for supplying the trough. The trough is never allowed to remain empty. The dry meal mixture is constantly within reach of all of the birds and they help themselves at will.

Oyster shell, dry cracked bone, grit and charcoal are kept in slatted troughs and are accessible at all times. A moderate supply of mangolds and plenty of clean water is furnished. About 5 pounds of clover hay cut into ½-inch lengths is fed dry, daily to each 100 birds, in winter. When the wheat, oats and cracked corn are given, the birds are always ready and anxious for them and they scratch in the litter for the very last kernel, before going to the trough where an abundance of food is in store.

It is very evident that they like the broken and whole grains better than the mixture of the fine, dry materials; yet they by no means dislike the latter, for they help themselves to it, a mouthful or two at a time, whenever they seem to need it, and never go to bed with empty crops, so far as noted. They apparently do not like it well enough to gorge themselves with it, and sit down, loaf, get over-fat and lay soft-shelled eggs, as is so commonly the case with Plymouth Rocks when they are given warm morning mashes in troughs.

Some of the advantages of this method of feeding are that the mash is put in the troughs at any convenient time, only guarding against an exhaustion of the supply, and the entire avoidance of the mobbing, that always occurs at trough feeding, when that is made a meal of the day, whether it be at morning or evening. There are no tailings to be gathered up or wasted, as is common, when a full meal of mash is given at night. The labor is very much less, enabling a person to care for more birds than when the regular evening meal is given.

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*Whole corn will be used hereafter at the Station. See comparison of whole corn and cracked corn on pages 180 and following.

For green food during winter and spring, mangolds are used. They are liked by the birds and when properly harvested and cared for remain crisp and sound until late spring. They are fed whole, by sticking them on to projecting nails, about a foot and a half above the floor. Care must be exercised in feeding them, as they are a laxative when used too freely. On the average about a peck per day to 100 hens, can be safely used. They would eat a much greater quantity if they could get it.

The average amounts of the materials eaten by each hen during the last year are about as follows:

Grain and the meal mixture	90.0 pounds.
Oyster shell	4.0 pounds.
Dry cracked bone	2.4 pounds.
Grit	2.0 pounds.
Charcoal	2.4 pounds.
Clover	10.0 pounds.

These materials cost about $1.45.

The hens averaged laying 144 eggs each.

COMPARISONS OF WHOLE CORN AND CRACKED CORN AS PARTS OF THE RATIONS FOR LAYING HENS.

The use of corn and corn meal as major parts of the food of hens kept for egg production has been very generally condemned by poultrymen and farmers, until it is now used only as a very minor part of the ration, for the fear that its use will cause over-fatness and interfere with egg making. When used more freely and made a prominent factor in the ration it has been thought best to have the kernels broken, so that in hunting and scratching for the small pieces the birds might get the exercise needed to keep themselves in health and vigor. It was reasoned that even a small quantity of whole corn could be readily seen and picked up from the straw litter, with little exertion, and that the vices of luxury and idleness would follow.

As told on page 179, in describing the Feeding of the Laying Hens in the Station Flocks; for each 100 hens, 4 quarts of screened cracked corn are scattered on the deep litter early in the morning and at 10 o'clock 2 quarts of wheat and 2 quarts of oats are mixed together and fed in the same way, the mixture of dry meals being in the slatted troughs within their reach all of the time.

At Go-well Farm, last October, 1000 April hatched pullets were put into 10 pens in the laying and breeding house and all of them received the same treatment for 6 months. The selections were made with great care so as to have the 100 birds in each pen comparable with those in every other pen. The 10 pens in which they were confined are 20x20 feet in size and exactly alike in construction and arrangement. In every pen the dry meal mixture, bone, shell, grit and charcoal, were constantly in the slatted troughs, and mangels and short cut clover were fed every day, to all alike. They had plenty of clean water, and the floors were well littered with straw, over 3 or 4 inches of fine sawdust.

As soon as the birds could see to eat in the mornings, they were fed. Those in the first 5 pens were given, in each pen, 2 quarts of wheat and 2 quarts of whole corn scattered evenly over the whole floor. At 10 o'clock they were fed again the same quantity and kind of food. Those in the second 5 pens received 2 quarts of wheat and a little more than 2 quarts of cracked corn in the morning and the same at 10 o'clock. As cracked corn is bulkier than whole corn, a measure was made, that holds a quantity that weighs the same as 2 quarts of corn while whole. The tables show the production of each of the 10 pens, each month, from November to April—one half the year.

Feed—Dry mash, wheat and whole corn.

EGG YIELDS IN FIVE ROOMS, IN EACH OF WHICH 100 PULLETS WERE PUT NOV. 1.

Month.	Room 1.	Room 2.	Room 3.	Room 4.	Room 5.
November	414	299	429	354	389
December	1283	1095	940	942	932
January	1404	1234	1024	1152	1149
February	1379	1315	1223	1369	1314
March	2014	1984	1959	2004	1945
April	1914	1926	1790	1862	1866
Total	8408	7853	7365	7683	7595
Approximate average number of eggs per bird	84	78	73	77	76
Birds died	3	6	4	3	3

Whole number of eggs laid by 500 birds	38904
Average number of eggs laid by each bird	77.8

Feed—Dry mash, wheat and cracked corn.

EGG YIELDS IN FIVE ROOMS, IN EACH OF WHICH 100 PULLETS WERE PUT NOV. 1.

Month.	Room 1.	Room 2.	Room 3.	Room 4.	Room 5.
November	389	210	324	331	157
December	1191	883	1038	995	847
January	1135	1179	1109	1145	1219
February	1260	1272	1285	1167	1316
March	1993	1921	1994	1973	1920
April	1906	1989	1997	1892	1921
Total	7874	7464	7747	7503	7381
Approximate average number of eggs per bird	79	75	77	75	74
Birds died	4	7	7	5	6

Whole number of eggs laid by 500 birds	37969
Average number of eggs laid by each bird	75.9

There were no interruptions or irregularities during the test. The weather was very severe during much of the winter, but the birds laid well in the open air houses and the losses were not heavier than usual with us.

There is nothing in the results that leads to the conclusion that it is necessary or advisable, to crack the corn fed to hens kept for laying eggs. The slight differences in the average yields of the birds in the two classes should not be interpreted as meaning that cracked corn is inferior to whole corn. Neither do the somewhat greater losses of birds on the cracked corn ration indicate that the cracked corn was injurious. There is nothing in the appearance of the birds in either of the ten flocks, to indicate lack of vigor or health, in any flock. An examination of the yields of the birds in the different rooms during the same, and succeeding months shows much regularity. The greatest variation in the average pen yields per bird was in Room 1 where it was 84 eggs, and in Room 3 where it was 73. The causes of this variation are not known.

In conducting feeding tests with any animals it is practically impossible to get individuals or groups that are exactly alike, or that will remain in exactly the same condition during consecutive weeks or months. The variations in animals are such, that reliable answers to delicate questions can probably only be secured by taking the average results from large numbers, that are apparently uniform in form, function and condition. In this test, 1000 individuals were employed, and the conduct of the work was such as to establish confidence in the results.

With corn costing from 55 to 65 cents per bushel of 56 pounds, the mill cost for cracking is usually from one to 2 cents per bushel. During much of the year cracked corn is liable to heat and sour if kept long, which necessitates buying in small quantities. This danger is less with whole corn, and it can usually be bought in large quantities to advantage. When cracked corn is not thoroughly screened the meal sifts out and is largely lost in the litter. Whole corn will take the place of cracked corn in feeding the mature birds of the Station flocks, except when experiments may require the use of other materials.

THE TOO FREE USE OF DRIED SUCCULENT FOOD.

The Station usually uses oat straw for bedding for laying hens. In April the supply of straw was short, and oat hay was substituted for it. The oat hay was made the previous summer, by cutting the oats when they were headed out, but before they commenced filling. It was nicely cured, and green in color. When first bedded with it the hens ate freely of the finer parts, and the morning following, the platforms under the roosts were flooded with their thin, liquid-like voidings. This continued, somewhat lessened, during the next 2 days, although the bedding was removed as soon as that was thought to be the cause of the trouble. They ate little food for 3 or 4 days and it was 8 or 9 days before they were consuming their usual amounts. The egg yields were about 60 per cent of the number of birds, just before the trouble began, but they were reduced to less than 10 per cent, and it was about 20 days before the birds regained their former productions.

In 2 pens the bedding was oat straw as usual, and there was no disturbance in those pens. It is not thought that the oat hay would have caused irregularities had it been fed sparingly. Long ago we learned that we must not feed mangels too freely, because of their laxative tendencies, but there was no thought that the dry hay, although made from young plants, was comparable with the crisp, juicy mangels.

ATTEMPT AT LICE EXTERMINATION.

There are no lice at all on the chickens, and they are not wanted on the fowls, but so far, it has been impracticable to keep clear entirely of them. The roost platforms are well cleaned every morning of the year, and the straw bedding is cleaned out and renewed every 2 weeks, except in summer when the birds are much in the yards, and then it remains 3 weeks before renewal. Kerosene and crude petroleum are used freely and frequently, on the roosts and adjacent woodwork, dust baths are provided, and the birds are occasionally dusted with a commercial lice killing powder, evidently composed chiefly of tobacco snuff. This powder is very destructive to lice life, but it is a good deal of a task to treat, individually, several thousand hens.

The University has 60 beautiful Horned Dorset sheep, and for 3 years there has not been a tick or nit found on them. They are perfectly clean and they have not been dipped for 3 years. Why can't lice be exterminated as completely on the hens as in the case of the ticks on the sheep? Last December the roosts and walls of the roosting closets in all of the rooms, but one, were sprayed with 2 different brands of liquid lice killers, which were warranted, by their makers, to destroy all of the lice on fowl, by the fumes penetrating among the feathers to the skins of the birds. The preparations were used according to directions. The roosts and woodwork near them were sprayed in the morning and left to dry, until the birds went to roost. But the sprayed paint was not fully dry at that time, although it was thinned by heating before applying it. The curtains of the roosting closets were shut down at bed time as usual and both ventilators, each of which are 3 feet long and 6 inches wide, were left wide open. Next morning it was very evident, from the appearance of the birds, that they had not enjoyed the night. They ate but little food during that, and the succeeding 3 or 4 days and did not have their usual appetites for 9 or 10 days. The 700 birds were laying over 300 eggs per day before the trouble, but they laid less than 100 per day during the following week, and did not lay as many as before, until 24 days had elapsed. Many of them moulted partially, or quite fully, and these did not lay much for 6 or 7 weeks. It was not thought that any birds died from the accident. Probably we were at fault in using the stuff in winter when it did not thoroughly dry out, as it might have done in a long, warm summer day. One pen at the end of the building was not sprayed, but the air in that room was loaded with the odor from the rest of the building, which easily found its way in, around the loosely fitting door. The birds in that room fell off in their egg yields for several days, but none of them moulted. Many of the birds in the sprayed rooms refused to go to roost in the closets again for several nights, until the odor had largely disappeared, while those in the unsprayed room went into their bedroom as usual. The reason for calling attention to this experience is, that others may guard against using such preparations too freely in cold weather.

The most unsatisfactory feature of this experience was, that the treatment did not kill the lice or materially lessen their numbers. It was only, when later, the birds were individually treated with the tobacco dust and insect powder, worked in among the feathers, that the lice were nearly exterminated.

The insides of the buildings are treated with these liquid preparations in warm weather, so that the woodwork may be obnoxious to the lice and prevent their lodging there. For this purpose they are satisfactory, but our experience with them shows plainly that any material, with odors sufficiently strong to penetrate the feathers and kill the lice on the bodies of live hens, will prove destructive to the hens themselves.